Environment and Natural Resources Trust Fund
2019 Request for Proposals (RFP)

Project Title: **ENRTF ID: 239-FH**

Improving Stream Restoration Designs to Prevent Project Failures

Category: H. Proposals seeking $200,000 or less in funding

Sub-Category: F. Methods to Protect, Restore, and Enhance Land, Water, and Habitat

Total Project Budget: $ 140,000

Proposed Project Time Period for the Funding Requested: June 30, 2021 (2 yrs)

Summary:

Costly river restorations can fail without an objective review process. We will develop methods to test and review designs before construction and will provide finalized methods for future projects.

Name: Ann Thompson

Sponsoring Organization: South St. Louis Soil and Water Conservation District

Title: Conservation Specialist

Department:

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Web Address

Location

Region: Northeast

County Name: St. Louis

City / Township: Duluth

Alternate Text for Visual:

Traditional design methods would not allow engineers and stream scientists to see velocities (bottom left image) or habitat suitability (top right image) for aquatic species but using the iRIC model to make design adjustments will ensure that velocity increases or decreases do not threaten aquatic habitat by resulting in bank erosion or filling in the channel and instead promote aquatic habitat.

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	_____%
____ If under $200,000, waive presentation?			

PROJECT TITLE: Improving Stream Restoration Designs to Prevent Project Failures

I. PROJECT STATEMENT

Degraded riverine habitats and impaired water quality cost the State of Minnesota millions of dollars each year. Additionally, millions of dollars more are spent each year on river restoration projects throughout Minnesota designed to improve water quality and habitat. However, river systems are complex and many restorations fail to withstand natural phenomena, such as low-probability floods. Therefore, an objective process that integrates many riverine health components is needed to evaluate channel restoration designs. This process would be used before implementation in order to prevent failures from occurring.

Numerical models can be used to objectively review and detect project flaws before the channels is built by simulating stream responses to extreme flood events, sediment transport, morphologic change, and habitat changes. Developing a review process will optimize state funded habitat and water quality restoration projects that are planned for the near and long-term future.

This project will use an open-source modeling framework called iRIC (International River Interface Cooperative, www.i-ric.org) to develop standard techniques and methods to take a proposed channel design and simulate a wide range of natural flow conditions with a three-dimensional numerical model. The model will detect restoration failures (possible erosion, increased stress to the banks, and locations of possible habitat degradation), and an iterative process will be used to select a final restoration design for implementation.

This project will be tested at the Mission Creek stream restoration project near the Fond du Lac neighborhood in Duluth, Minnesota. Mission Creek is a popular outdoor recreation area, and the stream channel was greatly impacted by the 500-year Duluth area flood of 2012. The DNR has provided the South St. Louis SWCD with 1.25 million dollars to build a new, stable channel to help repair and stabilize tributaries and gullies, promote trout habitat, and make the area more resilient to flooding. However, the current funding does not support this proposed work because it goes beyond traditional design methods by dynamically integrating sediment transport, habitat changes, flood events, and stream evolution. If the process is found to improve the design process and ultimately the water quality and habitat at Mission Creek, the method will then be applied to other stream restoration projects across the state.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: *Preparation of input data, model development to simulate proposed restoration designs, model simulations to detect project failures, and final results to inform design that will promote fish habitat, be more resilient to flooding, and stabilize eroding tributaries and gullies*

ENRTF BUDGET: $140,000

Outcome	Completion Date
1. Preparation of input data for model development	*September, 2019*
2. Model development will consist of taking input data to construct the model	*December, 2020*
3. Model simulations will produce results to detect project failures and final design will assess habitat changes, sediment transport capabilities, flooding tolerance and channel evolution under natural condition of designed channel.	*June, 2020*

4. Peer-reviewed, publically available data and a report will be a valuable resource so methods can be repeated while aiding in future, iterative restoration design and will be published with USGS cooperative matching-funds.	*June, 2021*

III. PROJECT PARTNERS:

A. Partners receiving ENRTF funding

Name	Title	Affiliation	Role
Joel Groten	**Hydrologist**	**USGS**	**Modeler/Lead Author/Technical Service Contract**

B. Partners NOT receiving ENRTF funding

Name	Title	Affiliation	Role
Karl Koller	**Clean Water Specalist**	**DNR**	**Natural Channel Design Expert**

IV. LONG-TERM- IMPLEMENTATION AND FUNDING:

This project would provide an important framework to help State, Federal, and local government objectively review stream restoration designs to help prevent project failures and to assist future restoration projects in meeting their goals and objectives. This project also would enable future projects to be modeled at a fraction of the cost because methods and results from this project will go through a peer-review process that will be documented in a publically available report and be available for future projects.

V. TIME LINE REQUIREMENTS:

The project duration will be from July 2019 through June 2021. The compiling and formatting of the input data will be completed by September 2019. The model development, simulations, and results will be completed by June 2020. Due to the complexity of the simulations, subsequent analysis, and the desire to produce repeatable methods, an extensive peer review will be completed with USGS cooperative matching-funds. Because of this, an additional 12 months will be needed to finalize the report. The total time requested will be 24 months.

VI. SEE ADDITIONAL PROPOSAL COMPONENTS:

A. Proposal Budget Spreadsheet
B. Visual Component or Map
F. Project Manager Qualifications and Organization Description

2019 Proposal Budget Spreadsheet

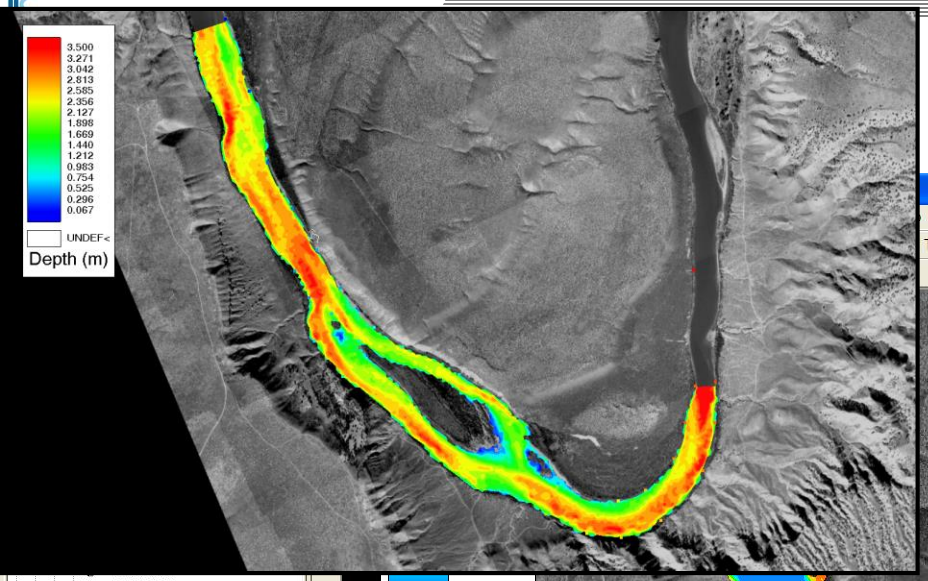
Project Title: Improving Stream Restoration Designs to Prevent Project Failures

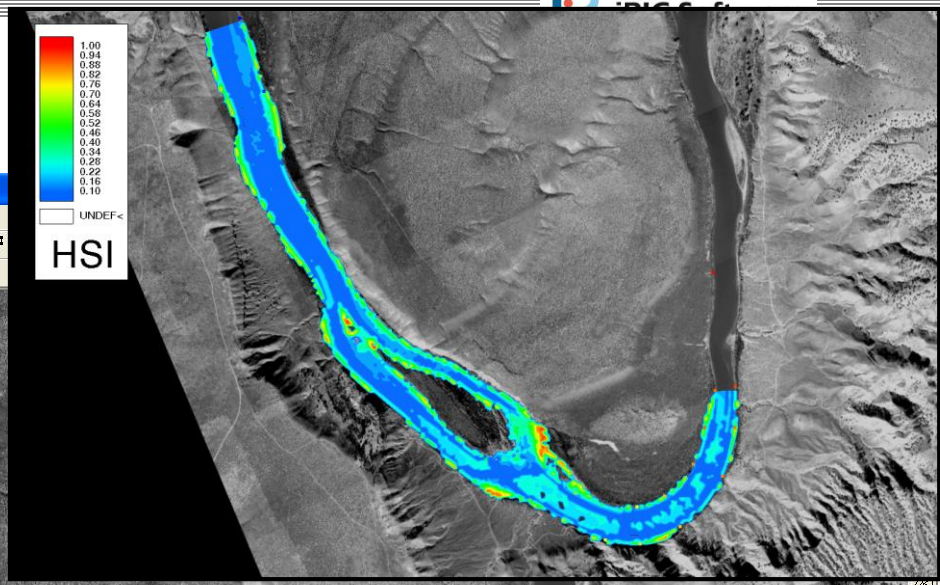
IV. TOTAL ENRTF REQUEST BUDGET: Two years

BUDGET ITEM (See "Guidance on Allowable Expenses")	**AMOUNT**
Personnel: 1 South St. Louis SWCD Project Manager (grant funded position); 5% FTE for two years; will oversee all administrative tasks of project and be the primary fiscal agent.	$ 10,000
Professional/Technical/Service Contracts: 1 USGS Hydrologist; 35% FTE for two years; technical services will include preparation of input data, model development, model simulation, data analysis, and data archiving. Includes travel costs.	$ 130,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	$ 140,000

V. OTHER FUNDS *(This entire section must be filled out. Do not delete rows. Indicate "N/A" if row is not applicable.)*

SOURCE OF FUNDS	**AMOUNT**	**Status**
Other Non-State $ To Be Applied To Project During Project Period: USGS Cooperative Matching Funds to go towards publically available peer-reviewed data and report.	$ 60,000	*Secured*
Other State $ To Be Applied To Project During Project Period: NA	$ -	
In-kind Services To Be Applied To Project During Project Period: NA	$ -	
Past and Current ENRTF Appropriation: NA	$ -	
Other Funding History: NA	$ -	





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Evolved_Elevation
Depth
GIC Coverage
GIC Nodes

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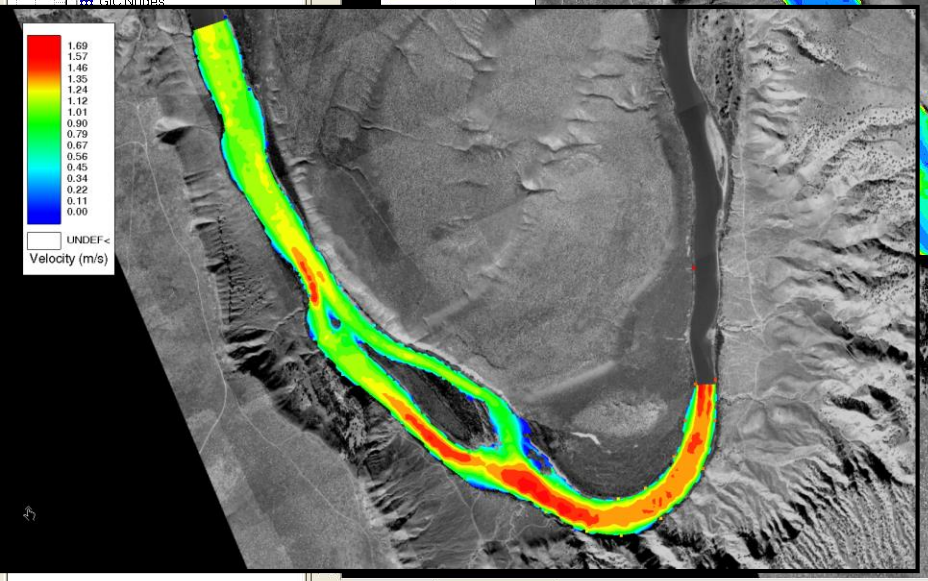

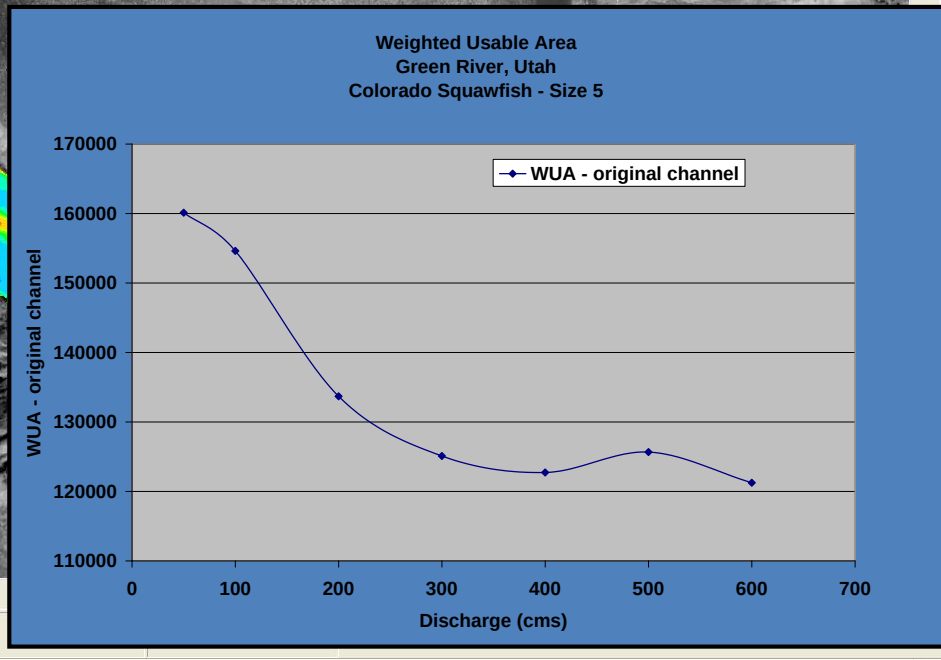

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PROJECT MANAGER AND TECHNICAL SPECALIST QUALIFICATIONS AND ORGANIZATION DESCRIPTIONS

Ann Thompson is a Conservation Specialist for South St. Louis Soil and Water Conservation District. Ann Thompson has a vast knowledge of stream function and river ecology, with a background in fisheries biology. She has experience managing large scale Natural Channel Design projects throughout Northeast Minnesota, performing assessment, management tasks and design review. She has knowledge and experience with many field techniques to be used on site and has currently been doing preliminary work for the Mission Creek restoration project.

The **South St. Louis Soil and Water Conservation District** (SSL SWCD) and our engineers have completed many large scale restoration projects with partners ranging from the Minnesota Department of Natural Resources to private landowners. Our design work is performed in collaboration with many partners to ensure that the best project is implemented on site. The SSL SWCD uses engineering grade GPS survey equipment and is proficient in design and GIS technology.

Joel Groten is a Hydrologist with the Minnesota U.S. Geological Survey (USGS) Water Science Center. He has a M.S. in Water Resources Science from the University of Minnesota. Joel serves as a project chief related to USGS sediment studies. In this capacity, he provides project oversight, technical assistance, and data analysis and reporting in support of sediment projects for the Minnesota Pollution Control Agency, Minnesota Department of Natural Resources, U.S. Army Corps of Engineers, Lower Minnesota Watershed District, and Rice Creek Watershed District. These projects vary in scope and relate fluvial sediment to aquatic habitat, TMDL studies, stream restoration, geomorphology, sediment budgets, and flood retention and diversion. Joel also is responsible for research and implementation of new technologies to improve understanding of sediment sources, fate, and transport mechanisms.

The **USGS** works as a partner with state and local government agencies. The USGS in Minnesota is uniquely positioned to carry out the work with its state-of-the-science in the office and has access to the most current science and technology related to sediment research from USGS scientists nationwide.